

Learning Theory Summary

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1. Social Learning Theory (Bandura)

This theory states that people learn essentially by observing and imitating other people. A simple example of this is the fact that babies learn to speak by imitating the words spoken by their parents, even though they may have no initial understanding of what the words mean.

Bandura stresses 4 key conditions necessary for effective learning: Attention, Retention, Reproduction, and Motivation. Obviously the individual must be paying attention to another person's behaviours/actions in order to learn what they are doing. Retention refers to the ability to remember what is observed, reproduction is the ability to perform the same action or behaviour which is observed, and motivation means having a reason to copy or learn the behaviour in the first place.

I think this also relates to the teaching of math, since in math class we often try to teach students how to solve problems by demonstrating the appropriate methods ourselves. If you open yourself up and allow students to not only observe what you write when you attempt a math problem, but also how you think (your thought process), then students are able to observe your strategies and imitate them in a similar way.

2. Bloom's Taxonomy (Bloom)

Bloom's Taxonomy is a way of classifying different levels of thinking skills. It is a pyramid which starts from the bottom and increases in this order: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating (this is the "new" Bloom's Taxonomy, the old one was slightly different). The theory essentially states that remembering is the lowest form of thinking, while creating is the highest form. In other words, when students begin to learn a new concept they begin at the bottom of the pyramid and work their way up. The first stage is to be able to remember something, for example, knowing the quadratic formula. The final stage is creativity, wherein a student has mastered a concept to the point of being able to use it to create something new.

As teachers it is important to keep in mind the hierarchy of Bloom's Taxonomy. Remember, for example, when you are introducing a new concept to begin by asking simpler questions that are lower on the scale of Bloom's Taxonomy, and gradually work up to the higher-order questions. It is also wise to have a variety of different types of questions on tests, quizzes, and so on.

3. Stage Theory of Cognitive Development (Piaget)

The Stage Theory of Cognitive Development states that a child goes through 4 stages of mental development in a particular order which gradually increases their ability to use higher-order thinking.

The first stage of development is called the sensorimotor stage (from birth to 2 years old) in which infants begin to develop a basic understanding of how reality works. The second stage is called the preoperational stage (ages 2 to 4). At this point children begin to classify objects according to similarities between them. The third stage is the concrete operations stage (ages 7 to 11), the child will start to explain what he or she sees/experiences using logic. The final stage is the formal operations stage (ages 11 to 15) in which the brain is finally able to understand abstract and hypothetical concepts. In other words, the brain no longer requires actual physical objects in order to make connections.

As I/S math teachers we may not be too concerned with the first two stages of development, but the last two stages will certainly affect our teaching. We will be dealing with students who are only just starting to use abstract thinking (and in some cases they may never reach this stage). We need to be mindful of this since many concepts in math are inherently abstract and may be difficult to understand for a learner who is still in the third (concrete) stage of development. We have to find ways in which we can use concrete objects to explain difficult abstract ideas.

4. Discovery Learning (Bruner)

This is an interesting theory which states that one of the best ways in which students can learn is through “discovery learning.” This means the students use their own prior knowledge and critical thinking skills to discover facts, concepts, and relationships for themselves, rather than being given the information by a teacher. There are many advantages to this method. For one, students may have more motivation to learn if the problems are posed to them as a personal challenge in which they need to use their own intellect to solve. It also promotes responsibility and independence. Lastly, students may be more likely to remember what they have learned if they went through the step by step process of discovering it for themselves.

The main potential disadvantage to this learning style is that students may find it excessively challenging leading to cognitive overload, and resulting in more confusion. Also, students may incorrectly solve a problem, but think that they have nonetheless succeeded, leading to false knowledge and information which may become difficult to correct in the future, if not dealt with soon after.

Nonetheless, I think this is an interesting and useful form of learning, particularly for mathematics. Since mastering math is so dependent on a good intuitive understanding of mathematical concepts, I believe that discovery learning is one of the best ways for students to attain this knowledge. It may not always work, and it may be tougher than the usual approach of a teacher simply stating the knowledge, but the rewards for this hard work are often even greater, as I have experienced myself in the past.

Peter's Taxonomy

